



Polymorphic Medicine

A New Model of Healthcare

How IoT can accelerate the digital transformation of health

Dr. Patrick Quinlan

CEO + Co-founder

Hippo Technologies, Inc.

IoT Slam Day Keynote | April 9, 2021



Today, we want to share our view of a different future, a future of our collective making—a new way to address health and the treatment of disease, a plan to create a profound improvement in the human condition.


INTRODUCTION

The rapid and widespread adoption of virtual care since the onset of the COVID-19 pandemic has accelerated the tipping point for virtual care technologies and presents us with a once in a generation opportunity to radically transform our healthcare system by moving to an approach that we call **Polymorphic Medicine**.

Polymorphic Medicine represents a paradigm shift towards the next evolution of healthcare. If the first decade of the 21st century was characterized by the “systemization” of healthcare with the introduction of electronic medical records, and the last decade saw the rise of genomic-based personalized medicine, we are now on the cusp of transitioning to the next phase – a re-humanization of healthcare with the system oriented around the individual, enabled by IoT technology, and informed by advanced analytics.

The time is now for a new type of healthcare, one that is focused on reducing the overall burden of disease at a population level and supporting a person to better manage their own health at an individual level. This requires a level of personal responsibility and accountability by the individual, accompanied by a legislative environment that prioritizes the promotion of health, while discouraging policies that undermine it. And it requires a systematic digital and cultural transformation in the way that healthcare is designed, delivered, and experienced.

Virtual Care provides the vehicle to rethink our ideas about health and the treatment of disease. **Polymorphic Medicine**, when fully implemented with the needs and preferences of individuals at the center and where Institutions and technology serve them and those who care for them, is the path to success – less disease, suffering, and cost with greater health benefit and convenience. Virtual Care served by **Polymorphic Medicine** and enabled by IoT is more than a mere extension of current practices – it is the path to a fundamentally new approach and ultimate success.



“We choose to go to the Moon in this decade and do the other things, not because they are easy, but because they are hard; because that goal will serve to organize and measure the best of our energies and skills, because that challenge is one that we are willing to accept, one we are unwilling to postpone, and one we intend to win.”

– John F Kennedy

Image courtesy of NASA

“Moon Shot” 1961

In 1961 President Kennedy presented a challenge to the nation worthy of its great capabilities — putting a man on the moon. He later presented a challenge to the nation worthy of its great heart — the Peace Corps. These two challenges brought out the best in our great nation and our people. It brought us together to conquer common goals that were greater than ourselves and that appealed to our sense of higher purpose.

We need challenges today that are greater than us, projects that outlive us.

Benevolent ambition brings out the best in us and unites us around a meaningful purpose. Here, we propose something similar, a goal that is a great challenge but within our grasp if we choose it.

The time is now to create a “Moon Shot” in healthcare.

“Moon Shot” 1969

While the specifics weren't clear on how we would get to the moon, we knew it was an engineering problem that could be solved. What it took was clarity, determination, and focus.

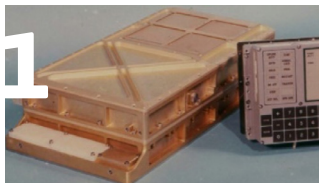
The reason it succeeded was because it put control in the hands of competent individuals. It effectively transitioned from institutional control [the Command Center in Houston] to individual control [the spaceship Command Capsule].

It was all about giving the astronauts the tools and controls they needed to reach their goals. The astronauts needed the right information at the time of decision so they could go in the right direction.

In just nine short years, NASA was able to go from the edge of research to implementing it. They were able to take the Houston Command Center and shrink it down into a tiny remote Command Capsule that was just 210 cubic feet.

There were three key success factors that made this happen which will be a recurring theme throughout this narrative:

- 1. New technology (physical)**
- 2. Remote support (virtual)**
- 3. Autonomous controls (self-care)**



Mini-Computers



Bio-medical sensors



Hospital in a kit



Image courtesy of NASA

Peace Corps “Moon Shot” Scaled

While the “Moon Shot” was created to train three astronauts to get to the moon, the Peace Corps was initiated to train millions of people to help those in other countries. The “Moon Shot” leveraged technology while the Peace Corps engaged people. It gave us an avenue to do good work, where it mattered most. Unlike the trip to the moon, however, we did not have the technology to change the trajectory of disease in the world.

Instead of giving people a fish, we taught them how to fish via:

- 1. New technology (physical)**
- 2. Remote support (virtual)**
- 3. Autonomous controls (self-care)**

However, the big difference between the Peace Corps and Apollo was that the Peace Corps went beyond technology to changing human behavior which helped people adopt and succeed on a grand scale.

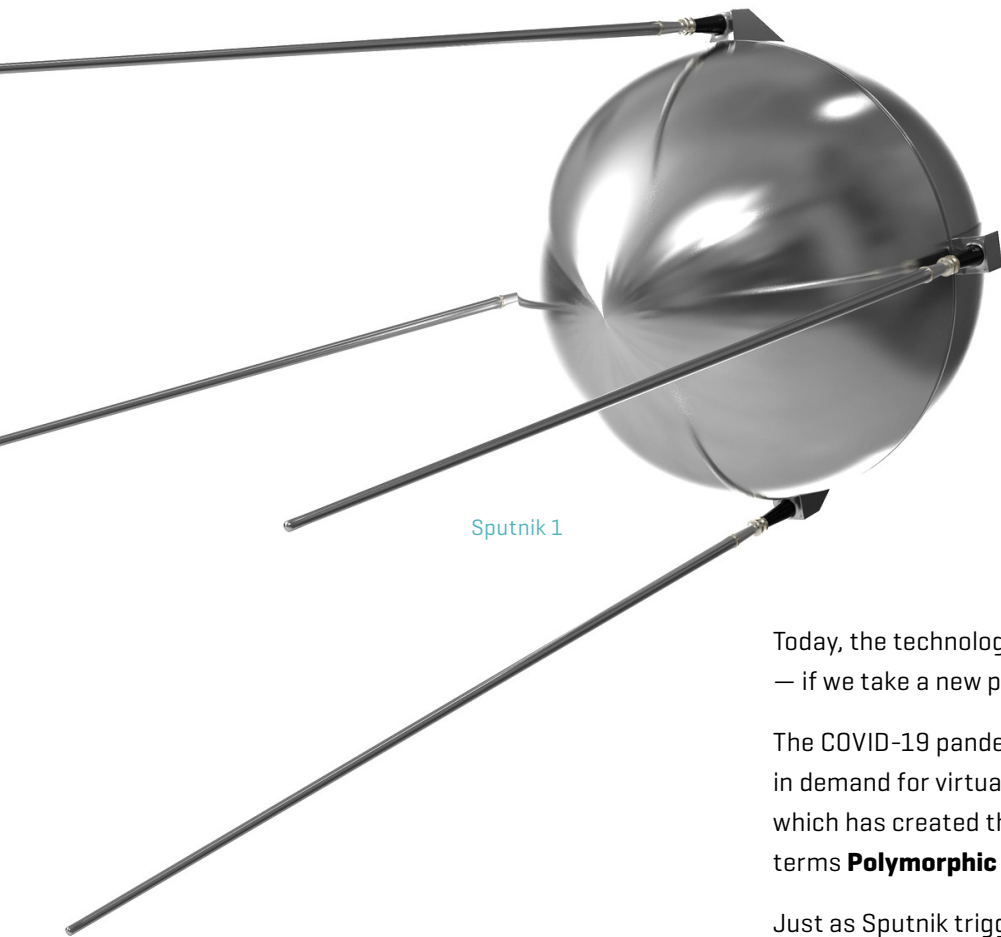


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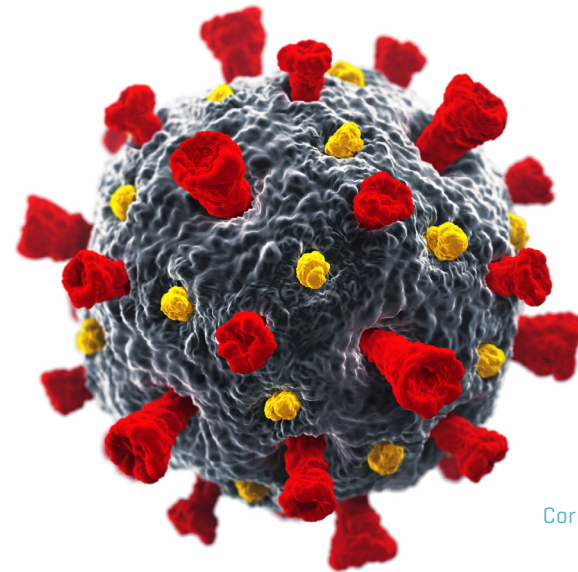


**Peace
Corps**

Welcome to the Age of Health



Sputnik 1



Coronavirus

Today, the technology and the medical expertise to both deliver care remotely and solve health problems exists — if we take a new path, if we rethink what we do in the promotion of health and the treatment of disease.

The COVID-19 pandemic has opened the door to new ways of delivering healthcare, with a massive increase in demand for virtual care. The rapid and widespread adoption of virtual care since last March is the catalyst which has created the opportunity to transform our healthcare system by moving to an approach that Hippo terms **Polymorphic Medicine**.

Just as Sputnik triggered the Space Age, COVID-19 will trigger the **Age of Health**.

The “Health Shot”

Today, the IoT community has the capability to reduce the disease burden in the world and provide healthcare access for all.

Like Apollo, we are moving from “Institutional Medicine” to “Individual Medicine” via

- Physical IoT Technology
- Virtual/Remote Support
- Self-Care

Like the Peace Corps, we are transitioning from provider-centric care to people-centric care, enabling millions of others to engage in self-care via IoT.



The rapid and widespread adoption of virtual care since last March offers the opportunity to transform our healthcare system by moving to an approach that Hippo Technologies, Inc. terms **Polymorphic Medicine**.

Many of us have older family members who cannot get out of the home easily, but over the last year all of us were stuck in our homes trying to figure out how to provide our own care.

A silent revolution occurred over the past year where the number of people who felt comfortable using telehealth went from 20 percent to over 70 percent

COVID has changed our appreciation and acceptance of home care using IoT devices. The loss of medical office access has improved patient confidence in remote self-care as consumers are more likely to utilize:

- Telehealth
- Health Coaching
- IoT Devices
- Remote Patient Monitoring
- Self-Care apps that integrate goal setting, care plans, monitoring and reinforcement/rewards
- Hospital-at-Home Acute Care



Telehealth/ Care Coaching



IoT Health Devices



Remote Patient Monitoring



Acute Care at Home



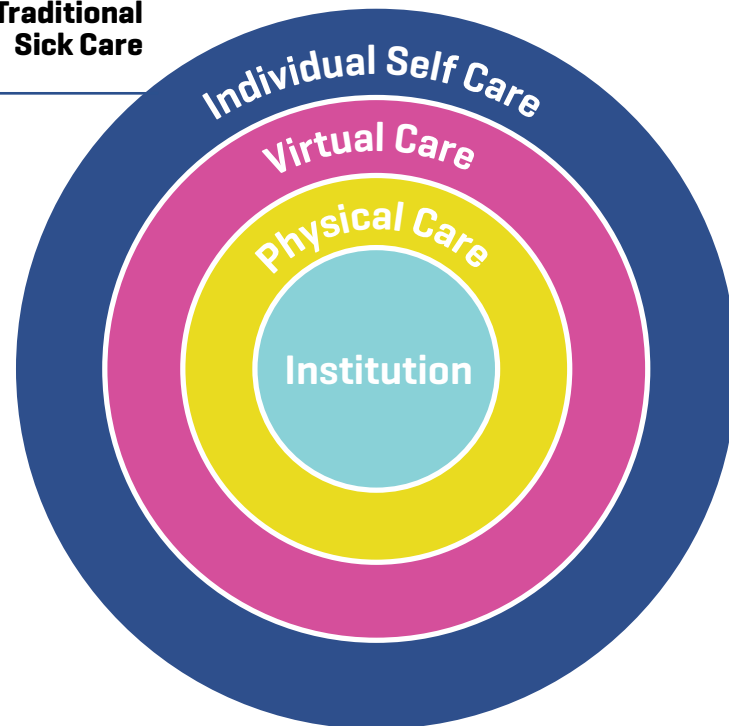
Self-Care Apps

Polymorphic Medicine

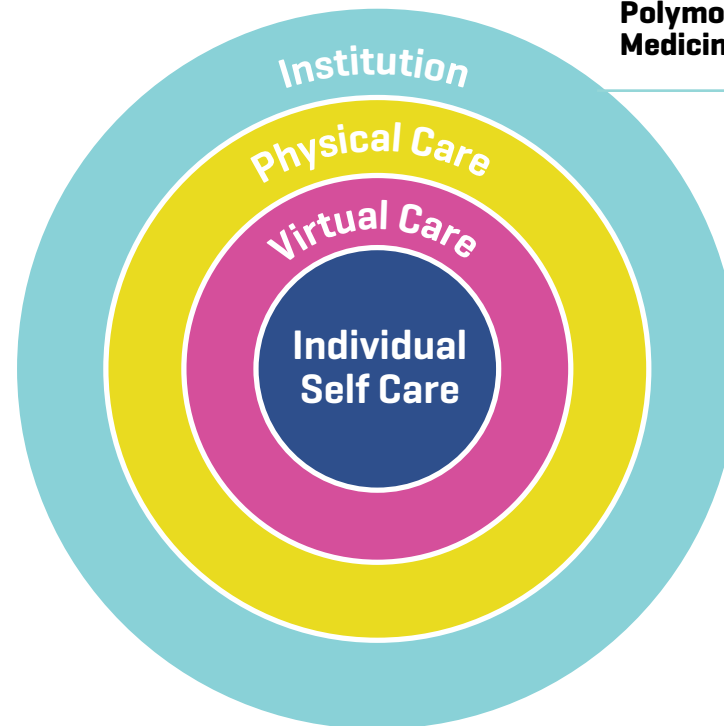
Polymorphic Medicine is anchored in self-care and disease prevention, blending physical care, virtual care, and self-care to match the patient's needs and preferences with local resources to achieve optimal outcomes.

We need to create an environment that transitions from traditional “sick care” to wellness and prevention. This requires that people see healthcare in a whole new way — placing patient self-care as the central focus.

**Traditional
Sick Care**



**Polymorphic
Medicine**





Members of the IoT Community, in this audience and beyond now have the capability to **reduce the disease burden in the world and create healthcare access for all.**

Just as we knew that technology was ready for the development and implementation of the space program, we know that IoT is a rapidly evolving technology where the “possible” is being invented right now.

What we need is clarity, determination and a clear focus on the way it can transform health.

We also need a new focus on KPIs that matter to the individual. KPIs such as obesity, fitness, mobility, vital signs, reduced chronic disease – all of these can be tracked with IoT devices in a way that is both meaningful and actionable.

Disease Burden

Super User Overload

The problem we face is the disease load or the burden of disease – i.e., the number and severity of diseases in a given population. This load is not evenly distributed. Currently, the burden of healthcare costs is concentrated in an unfortunate group of patients who suffer with multiple health problems [comorbidities], who are sometimes referred to as “super users”. This group comprises only five percent of the population but generates 50 percent of healthcare expenditures. This leverage is both an opportunity and a threat. If we can manage this group more effectively and humanely to reduce the migration of patients into this high-use category so that we materially reduce this absolute number, we can win the national battle against disease and suffering.

The commitment is to focus on wellness rather than sickness. To focus on behavior change leveraging the real-time feedback capabilities of IoT.



“Stay the hell out of the hospital. Hospitals often make sick people sicker. They’re sources of infection to vulnerable patients. They’re disorienting. They run costly tests and look for issues that are better left alone. Super-users represent a failure of the system.”

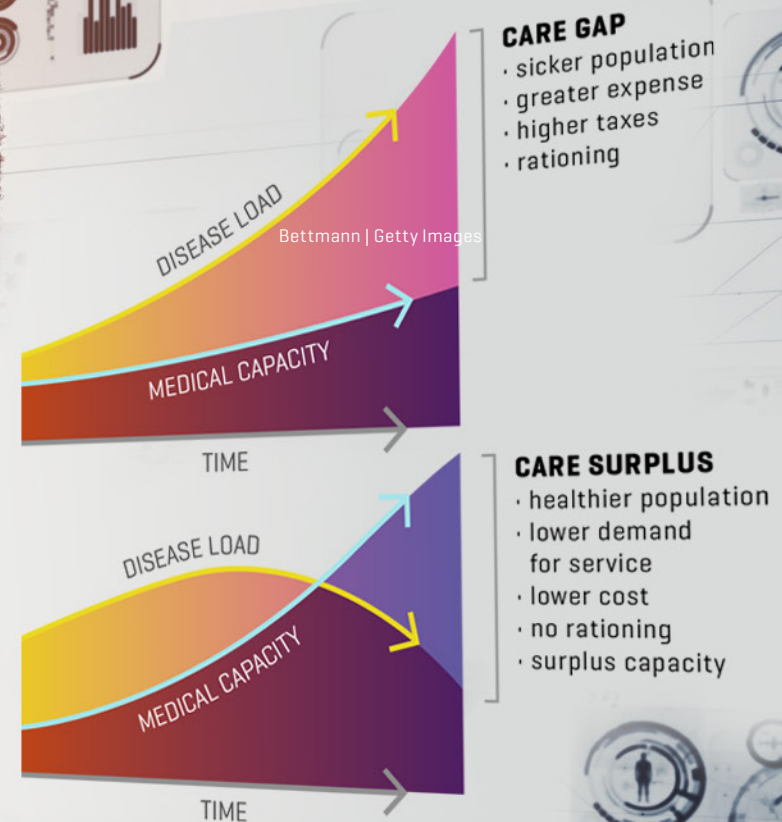
– Dr. Harlan Krumholz, Yale University and Yale-New Haven Hospital

The Health KPI

We propose a national Key Performance Indicator (KPI) of the disease burden

There are many widely accepted measures of healthcare, but the absence of the most important one is telling – overall disease burden.

The Health Shot will require new goals and measures to break us out of our sickness trajectory and change our focus from **Institutional Health** to **Individual Health**. We propose a national Key Performance Indicator (KPI) of the Disease Burden as the single most important measure of health in the country and the best focus for thought and action. It should be this measure that will inform and direct us as we design and implement programs for health and the treatment of disease. It should be our “compass” as we navigate the many issues inherent in health and disease. Without this compass, it is hardly surprising that we are lost.



The Consumer Empowerment Curve

There are three things that need to happen for consumers to gain control over their own health:



- 1** Individuals must actively research their symptoms and health information online –
They need to be motivated to take control.

- 2** They must be able to track their personal health data using wearables –
They must be informed about their health KPIs.



- 3** The patient must have the ability to interpret that massive amount of health data and provide themselves with direction –
They need actionable information to be engaged in managing their own health.



Personalized Healthcare

We have the opportunity to personalize healthcare through systemic digital and cultural transformation to change how healthcare is designed, delivered and experienced. How we define “patient-centered care” has a profound effect on planning and execution – is it an extension of current practices or is it the founding principle and anchor point of a new model of care? We coined the term **Polymorphic Medicine** to clearly signal a different approach.

What does personalized healthcare mean?

It means:

- A new level of personal competency
- A new level of individual personal goals
- A new level of personal measurement
- A new level of personal control
- A new level of personal learning
- A new level of personal medicine

All of these can come together and be enabled by IoT.

“It’s patient self-management — what people do within their chronic illness 365 days a year — that matters the most.”

– Dr. Alan Glaseroff, Co-founder, Stanford Coordinated Care Program



Virtual Care in the Home

Polymorphic Medicine takes “patient-centered care” to where it should reside — in the home where beliefs, habits, and behaviors develop and exist. If we are truly patient-centered, patient preferences should drive decisions.

This new system uses Virtual Care to surround, inform, motivate, and enable the individual through self-care. Individuals should only access physical care when required for better outcomes. The system serves the patient in terms of how, when, where, and why services are rendered.

The idea is to make you aware of what you are doing and to also make you aware of if what you are doing is incompatible with what you want to achieve.

The mindset needs to change from “*I get my healthcare in the doctor’s office controlled by my provider*” to “*I get my healthcare in my home controlled by me with remote support from my provider when needed.*”



Healthcare + Peoplecare

“Healthcare is not a technology business in need of people,
it’s a people business in need of technology.”

– Pat Quinlan, CEO, Hippo Technologies, Inc.

“Treating People not just Symptoms”

To drive fundamental change, achieve greater health and reduce suffering and cost in absolute terms, we must understand and address the root causes of the nation’s disease burden. We are rightfully at work to address disease and suffering today, but we have been remiss in reducing the scale of the problem.

We know the stories that preface so many speeches on healthcare in the United States. These are variations on the theme of the relentless increase in cost and disappointing health indices for the nation. This is hardly surprising, since our efforts center around treatment of the symptoms of the greater problem rather than on targeted programs to reduce or eliminate the root causes.

The answer, of course, is to do both and to know that until we do, we will continue to fail. To quote Dr. Don Berwick, former head of the Centers for Medicare and Medicaid Services [CMS], “The healthcare system as a whole is out of balance. We put far more into hospital care than we do keeping people from having to be in the hospital.”



Self-Care

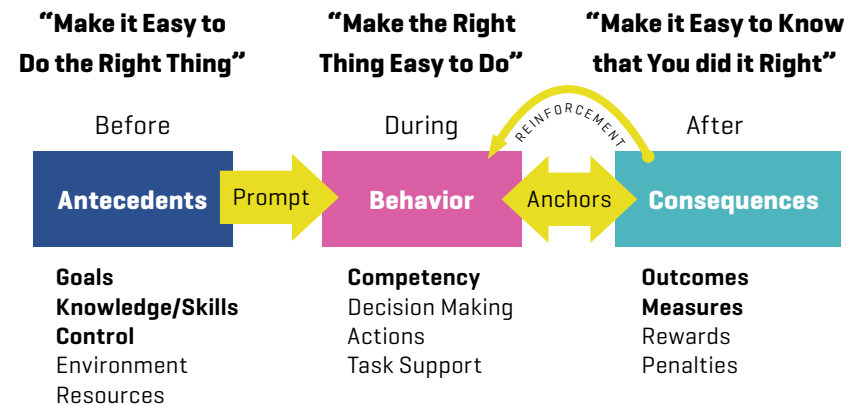
While genetics, environment, and lifestyle drive disease, we know that self-care behavior drives nearly 50 percent of patient health. Lifestyle and its inherent behaviors are the immediate keys to health. Most importantly, we must recognize that these behaviors exist for powerful reasons. Knowing what to do is not enough. Unsurprisingly, the occasional visit to a doctor's office typically proves inadequate to fundamentally change these behaviors.

Understanding and committing to self-care behavior change is the best way to reduce the Individual and National Disease Burden.

Self-Care is about Behavior Change

People change by changing their behavior and IoT can support positive behavior change. Self-care is at the heart of this transformation and is closely supported by both virtual and physical care settings.

By engaging, supporting, and empowering patients to adopt healthy behaviors at the points of decision, we can prevent chronic diseases and support recovery so that health becomes a way of life for the individual and for the nation.



IoT can help consumers before, during and after by:

- **Motivating:** Prompting them to "Make it easy to do the right thing"
- **Enabling:** Supporting them to "Make the right thing easy to do"
- **Informing:** Reinforcing them to "Make it easy to know that you did it right"

Another key component is a real-time feedback loop which gives them data to make informed adjustments to their behaviors "in the reachable moment" if their actual outcomes do not equal their desired outcomes.

Health IoT is the Enabler for Virtual Self-Care

Health IoT does three critical things to enable virtual self-care, it:

1. Provides the physical connections

2. Enables the virtual coordination

3. Supports self-motivated behavior change in the form of:

- Setting targets
- Delivering health education
- Incentivizing personal control
- Nudging behavior change
- Supporting task achievement
- Measuring key indicators
- Reinforcing goals/outcomes
- Providing alerts and course correction

What we need is an integrated self-care platform to make it easy to use IoT together to enable millions of people to reach a new healthcare destination in their own “capsule.”



Leading the Age of Health

Polymorphic Medicine through Virtual Care informs the patient of the individual risk factors and how to manage them, combined with the motivation to implement required changes. This type of motivation is essential – intrinsic motivation is the best impetus for lasting change in a free society. Lifestyle is highly personal and complex. It is paramount that the message and methods be respectful, humane and inspiring. This requires authentic leadership that unites us, not force that divides us. Leadership must draw people towards health and foster cooperation, not command compliance which fosters resistance. The combination of virtual care with public and private policies enables the implementation of healthy behaviors and habits.

Physical technologies at the point-of-care enables Virtual Self-Care that provides the vehicle to rethink our ideas about health and the treatment of disease. **Polymorphic Medicine** is the path to success – less disease, suffering, and cost with greater health benefit and convenience; when it is fully implemented with the needs and preferences of individuals at the center and where Institutions and technology serve them and those who care for them. Virtual Care served by **Polymorphic Medicine** is more than a mere extension of current practices – it is the path to a fundamentally new approach and ultimate success.

Health IoT is uniquely positioned to drive a new “Moon Shot” for healthcare. Only IoT can simultaneously provide the point-of-care technology, virtual coordination and informed self-care that is needed to make a meaningful impact. These are the crucial elements that drive individual behavior change to motivate, enable and inform a new approach to health. But IoT technology alone will not suffice. IoT designers must embrace the polymorphic vision to create solutions that not only gather and report data, but also actively support direct patient care behaviors and reinforce desired outcomes. **IoT must step up from a passive background technology to become an active driver of the new patient self-care reality.**





About Hippo Technologies, Inc.

Hippo Technologies, Inc., is a global virtual care company servicing the healthcare and medical education industries. The Hippo Virtual Care™ platform includes a hands-free, voice-activated, head-worn tablet and HIPAA/GDPR compliant software allowing clinicians to communicate and video conference in real time with remote colleagues and students, search medical records, and automatically access files and imaging during patient examinations, procedures, consultations and rounding. Hippo delivers a unique “through the eyes of the clinician” experience with all the safety and convenience of remote care. For more information, please visit: **myhippo.life**



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Published By:

The Healthcare Institute
for Virtual Education (HIVE)
hippohive.org

Authors:

Dr. Pat Quinlan
Tom Fee
Leyan Phillips
J. Kevin Tugman [Chief Creative]

Contact us: engage@myhippo.life